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Systematic review and meta-analysis of Traditional Medicinal Plants for Treatment of Pulmonary Tuberculosis in Africa

Mathulo shauli[1], Constance R Rusike[2], Lubabalo Macingwana[3]*

ABSTRACT

Condition or domain being studied

Population health; Intervention Regime; World Health Organization Ordinal Scale

Pulmonary tuberculosis is a global, ancient, and chronic disease affecting the lungs. It is treated and managed by the administration of Western regimes. Despite the availability of these drugs, the use of traditional medicinal plants by African populations is still a continuing practice as an alternative and complementary medicine to manage tuberculosis. Recent studies investigating the efficacy of these traditional medicinal plants have yielded positive findings, as reported in the literature. With extensive drug resistance among Tuberculosis patients, this alone has motivated researchers to test and investigate if indeed medicinal plants could be effective as alternative therapies to consider for tuberculosis management in Africa.

Rationale for the review

Medicinal plants for tuberculosis treatment have been studied both in vitro and in vivo (1, 2) and continue to be investigated in Africa (3). However, the literature reports based on scientific evidence have not clearly stated the level of their efficacy and have not strongly highlighted the important data on these African medicinal plants. the degree of their efficacy remains poorly documented, which is the focus of this review. Numerous studies across Africa continue to investigate the efficacy of traditional medicinal plants as potential candidates for the discovery and development of novel tuberculosis treatments (4). This review aims to collate and provide a detailed literature review of all African Medicinal Plants that have been tested for their anti-Mycobacterial properties. It will not only add value to the existing body of knowledge but also report on the degree of efficacy demonstrated by individual tested medicinal plants. The medicinal plants that have demonstrated efficacy could be further studied by scientific investigators to move forward in inventing novel drugs from natural products. So, the research question in this review is whether the tested medicines are indeed effective.

Review objectives

1. Are African traditional medicinal plants scientifically documented for their efficacy?
2. Does literature provide the degree of efficacy of all investigated traditional medicinal plants of Africa?To what level do the medicinal plants exhibit their efficacy against tuberculosis?
3. Does literature provide the degree of safety of all studied African medicinal Plants that have exhibited efficacy?
4. Which plant parts have been studied and have displayed efficacy?
5. Which study models have been used to study the efficacy of African traditional medicinal plants? and to what degree?

Keywords: Pulmonary tuberculosis; *Euclea natalensis*, and *Allium sativum*, African traditional medicinal plants; Efficacy; Invivo; Invitro

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1*Corresponding author: Mathulo Shauli (mshauli@wsu.ac.za). ORCID: 0000-0001-9322-1862, Prof Constance R Rusike, Lubabalo Macingwana,s Walter Sisulu University. South Africa; Review affiliation-Walter Sisulu University

Conflict of Interest—none | Funding—none

Population

Included

All studies that have reported on anti-Tuberculous activity of traditional medicinal plants and have been conducted both in vivo and in vitro, including studies in humans

Excluded

Unpublished articles, reviews, reports, and conference abstracts that do not have full data on the efficacy.

Intervention(s) or exposure(s)

Included

Traditional Therapy; Herbal medicine; Traditional, complementary and alternative medicine; Herbal Tea

Evaluating the efficacy of traditional medicinal plants in Africa

Included will be papers that report on botanically verified medicinal plants and confirm the identity and specific species of plants used for the treatment of tuberculosis. Papers that established an ethnobotanical approach to understanding how traditional medicinal plants are used to derive new drugs from such insights. Studies reporting on well-controlled clinical trials, thus establishing the safety and efficacy of traditional medicinal plants used, shall be included.

Studies that have documented chemically and biologically identified and isolated the specific compounds with therapeutic activities from medicinal plants shall be included.

Excluded

Studies on medicinal plants that do not have evidence of botanical verification shall be excluded.

Studies on medicinal plants that lack evidence of ethnobotanical data, with limited information on their traditional use, will also be excluded. Studies, reviews, reports, conference abstracts, and unpublished articles without full data on efficacy shall be excluded.

Comparator(s) or control(s)

Included

PICO tags selected: Drugs for Treatment of Tuberculosis; Rifampicin; Ethambutol

Studies that report on the efficacy of traditional medicinal plants where controls in the form of tuberculosis drugs have been used as controls, and have afforded positive efficacy results, shall be included. Both the drugs used for sensitive strains and resistant strains of Mycobacterium tuberculosis should be included.

Excluded

Studies that do not have sufficient data, or do not have data at all on the efficacy of tuberculosis drugs as compared to medicinal plants tested, will be excluded.

Study design

Only randomized study types will be included.

Included

A randomized study that will display the difference between the efficacy of the traditional medicinal plant and the control tuberculosis drug will be included. A study that would have generated high-quality evidence data on efficacy outcomes compared to the standard control (tuberculosis drug), and would carry no bias.

Excluded

Non-randomized studies will be excluded if they do not provide full evidence of efficacy outcomes.

Context

Pulmonary tuberculosis is the disease of the poor, living in poor settings with less accessibility to health care facilities, and embedded in poverty and poor living conditions. Studies by Oxlade et al., and Lee et al., provide sufficient evidence that tuberculosis indeed affects poor communities (4, 5). This review focuses on all studies conducted in Africa, which is classified as a low-income country. Interventions in the form of tuberculosis diagnostics and management will typically focus on these low-income countries, serving as a setting that affords high-quality data for tuberculosis interventions. For these reasons, this review will include all papers, reports, and articles whose data were generated in low- and middle-income countries. These settings utilize traditional medicinal plants as alternative interventions to mitigate the scourge of tuberculosis.

TIMELINE OF THE REVIEW

Date of first submission to PROSPERO

23 August 2025

Review timeline

Start date: 1 September 2025. End date: 28 November 2025.

Date of registration in PROSPERO

23 August 2025

AVAILABILITY OF FULL PROTOCOL

Availability of full protocol

A full protocol has been written and uploaded to PROSPERO.

SEARCHING AND SCREENING

Search for unpublished studies

Only published studies will be sought.

Main bibliographic databases that will be searched

The main databases to be searched are *CENTRAL - Cochrane Central Register of Controlled Trials*, *PubMed* and *Scopus*.

Other important or specialist databases that will be searched

Web of Science

Google scholar

Search language restrictions

The review will only include studies published in English.

Search date restrictions

There are no search date restrictions.

Other methods of identifying studies

Other studies will be identified by: *looking through all the articles that cite the papers included in the review ("snowballing")* and *searching trial or study registers*.

Additional information about identifying studies

World Health Organization reports

A full search strategy has been uploaded to PROSPERO.

Selection process

Studies will be screened independently by at least two people (or a person-machine combination) with a process in place to resolve any differences.

Other relevant information about searching and screening

None

DATA COLLECTION PROCESS

Data extraction from published articles and reports

Data will be extracted independently by at least two people (or a person-machine combination) with a process in place to resolve any differences.

Authors will be asked to provide any required data not available in published reports.

Study risk of bias or quality assessment

Risk of bias will be assessed using *Cochrane RoB-1* and *Cochrane RoB-2*

Data will be assessed by one person (or a machine) and checked by at least one other person (or machine).

Additional information will be sought from study investigators if the required information is unclear or unavailable in the study publications/reports.

Reporting bias assessment

The Cochrane Risk of Bias Tool (RoB 2) for intervention studies aims to identify potential sources of systematic errors in the design, conduct, or analysis of an individual study. This method will provide evidence of how well the results of each study in this review can be trusted by assessing randomization and the handling of missing data that affect the validity of the results from such studies.

Certainty assessment

Certainty of findings will not be assessed

OUTCOMES TO BE ANALYSED

Main outcome

Traditional medicinal plants such as *Euclea natalensis* and *Sanicula elata* have displayed a high degree of efficacy in studies conducted in vitro, *Alstonia scholaris* in vivo, and ginger and curcumin in human clinical trials, against tuberculosis, and have exhibited promising potential as candidates for drug discoveries. Medicinal plants published where active compounds have been isolated, tested, and validated for efficacy in tuberculosis. Medicinal plants that have been published with a high degree of efficacy and have not shown any toxicity effects upon investigations.

Additional outcomes

There are no additional outcomes.

PLANNED DATA SYNTHESIS

Strategy for data synthesis

This review will follow the PRISM guidelines published for systematic reviews (5) for randomized studies. This Systematic review protocol will be registered with the PROSPERO database of systematic reviews upon completion (One reviewer will conduct the search on all studies conducted in both in vitro and in vivo settings, and the second reviewer will conduct the search for all studies conducted in clinical trials involving humans. From all the searches, duplicated studies will be removed. Following the Cochrane recommendations, on systematic reviews of randomized studies, we will review the study designs' features across all the studies to be reviewed (animal handling and treatments in cases of in vivo studies, methods of preparing the medicinal plants, and concentrations used). In human clinical trials, the following study features will be considered: population, age, gender, concentrations of medicinal plants administered,

and duration of treatment. For in vitro studies, similar study design features, such as concentrations used, duration of treatments, and methods of preparing medicinal plants, will be considered, given the high statistical power. Only studies that meet the criteria will be included in the review. Two independent reviewers will screen both the titles and abstracts of all studies identified using the search strategy to select those that meet the inclusion criteria. All eligible studies will be downloaded and saved into both the EndNote and Scopus libraries. A file will be created to keep all the studies that are excluded. A summary table will be created of all studies that demonstrate the efficacy of medicinal plants in both categories of studies for this review (in vitro studies, in vivo studies, and Human clinical trials).

CURRENT REVIEW STAGE

Stage of the review at this submission

Review stage	Started	Completed
Pilot work	Dec 2025	march/2026
Formal searching/study identification	Sept 205	march/2026
Screening search results against inclusion criteria	April 2026	May 2026
Data extraction or receipt of IPD	April 2026	May 2026
Risk of bias/quality assessment	April 2026	May 2026
Data synthesis	June 2026	July 2026

Medical Subject Headings

Chronic Disease; Tuberculosis; Tuberculosis, Pulmonary; Lung; Humans; Complementary Therapies; Drug Resistance; Pharmaceutical Preparations; Plants, Medicinal

SIMILAR REVIEWS

Check for similar records already in PROSPERO

PROSPERO identified a number of existing PROSPERO records similar to this one (last checked on 22 August 2025). These are shown below, along with the reasons provided by the review team for the differing reviews and/or their progression.

- Ethnobotany, ethnopharmacology and phytochemistry of traditional medicinal plants used in management of symptoms of tuberculosis in East African Community: a systematic review [published 5 July 2020] [CRD420201870981]. The review was judged **not to be similar**
- Ethnopharmacological Insights, Phytochemical Profiles and Antiviral Properties of Medicinal Plants Used Against Poxviruses in East Africa: A Systematic Review [published 4 November 2024] [CRD42024605699]. The review was judged **not to be similar**
- Medicinal plants traditionally used to treat tuberculosis in the world: A systematic review [published 26 June 2024] [CRD42024558530]. The review was judged **not to be similar**

PROSPERO version history

- Version 1.0, published 23 Aug 2025